

Application No. 10/776,280
Reply to Office Action of February 10, 2005

IN THE DRAWINGS

The attached sheet of drawings includes changes to FIGS. 5 and 6. Sheet 1, which includes FIGS. 1-6, replaces the original sheet including FIGS. 1-6.

Attachment: Replacement Sheet (1)

REMARKS/ARGUMENTS

Favorable reconsideration of this Application, as presently amended and in light of the following discussion, is respectfully requested.

This Amendment is in response to the Office Action mailed on February 10, 2005. Claims 1-20 are pending in the Application, and Claims 1-7 stand rejected. Claims 1-7 are amended and new Claims 8-20 are added by the present Amendment.

Claims 4-6 have been identified as allowable if amended to overcome the outstanding rejections under 35 U.S.C. § 112, second paragraph. The indication of allowable subject matter is noted with appreciation. However, as further discussed below, because Applicants believe that Claim 1 contains allowable subject matter, Claims 4-6, although amended to overcome the outstanding rejection, have not been rewritten in independent form at this time.

Applicants have amended several paragraphs in the specification to correct minor grammatical informalities. Entry of those amendments is respectfully requested.

FIGS. 5 and 6 were objected to because they lack a prior-art legend. Applicants have submitted a replacement for FIGS. 5 and 6, correcting the informalities noted by the Examiner, and respectfully request reconsideration of the objection thereto.

The abstract of the disclosure and the specification were objected to because of minor informalities. Applicants have submitted a revised abstract and an amendment to the specification to address those objections and respectfully request reconsideration of the same.

Claims 1-7 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Applicants note with appreciation the time taken by the Examiner to identify specific areas needing revisions. Applicants submit that the enclosed amendments to the claims have overcome the rejection under 35 U.S.C. §112 and respectfully request its withdrawal. It is believed that all pending claims are definite and no further rejection on that basis is anticipated. If, however, the Examiner disagrees, the Examiner is invited to

Application No. 10/776,280
Reply to Office Action of February 10, 2005

telephone the undersigned who will be happy to work with the Examiner in a joint effort to derive mutually acceptable language.

Claims 1, 2, and 7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Fukuno (U.S. Patent No. 6,089,822) in view of North et al. (U.S. Patent No. 505,175, hereinafter “North”).

Applicants respectfully submit that Fukuno and North, neither individually nor in any combination thereof, support a *prima facie* case of obviousness of the invention recited in Claim 1. This is so because, even when combined, these references do not teach or suggest all the claimed features.

According to a feature of the invention as set forth in Claim 1, a turbine vane is recited, comprising, among other features, a perforated liner defining a cavity between an outside wall of the liner and an inside wall of the vane. Admission and exhaust openings are provided for cooling the vane with air. The liner is secured to the vane at a first end and free to slide along an inside edge of the vane at a second end in order to accommodate relative thermal expansion between the liner and the vane. Between the free end of the liner and the inside edge of the vane, an annular gap is provided defining a leakage zone for cooling air. In addition, a recess is provided in the inside edge of the vane to generate a head loss in the leakage zone so as to reduce a flow rate of cooling air passing through said leakage zone.

The outstanding Office Action asserts that the passages 92 of Fukuno are the recited recess, Applicants respectfully disagree. The multiplicity of passages 92 in Fukuno are discharge passages for cooling air supplied from the trailing edge passage 44 into the cavity 45 that is then injected through the small holes 101 of the impingement plates 83, 84 for cooling of a central portion of the inner shroud 126. Furthermore, Applicants respectfully submit that passages 92 do not generate a head loss in the asserted leakage zone near element 73 so as to reduce a flow rate of cooling air passing through that zone. As illustrated in

Application No. 10/776,280
Reply to Office Action of February 10, 2005

Fukuno, given the small clearance between the end of the cylindrical member 47 and inner shroud 126, what Applicants assume to be the asserted leakage zone in Fukuno, and the multiplicity of passages 92, any head loss, or flow resistance, in that region of Fukuno is generated in the small clearance, which then forces the air to flow through the passages 92 to exit the vane.

The outstanding Office Action acknowledges that Fukuno fails to disclose that the cylindrical member 47 is secured to the vane at one end. In addition, Applicants respectfully submit that Fukuno is silent with respect to, and the outstanding Office Action fails to document in the record, the other end of the cylindrical member 47 being free to slide along an inside edge of the vane due to relative thermal expansion between the liner and the vane.

North is being cited for teaching a tubular member 47 attached to the shroud 27. However, in North, the axially extending passages 92 and 92' are not disposed in the leakage zone between the free end of the liner and the inside edge of the vane, but emerge in the exhaust cavity. Thus, North cannot remedy the above-noted deficiency of Fukuno.

Based at least on the foregoing, Applicants respectfully submit that Fukuno and North, neither individually nor in any combination, make obvious the invention recited in Claim 1. In addition, Claims 2 and 7 should be allowed, among other reasons, as depending either directly or indirectly from Claim 1, which should be allowed as just explained. For the foregoing remarks, Applicants respectfully request withdrawal of the rejection of Claims 1, 2, and 7 under 35 U.S.C. § 103(a).

Claim 3 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Fukuno and North and further in view of Soechting et al. (U.S. Patent No. 5,176,124, hereinafter “Soechting”).

Applicants respectfully submit that Fukuno, North, and Soechting, neither individually nor in any combination thereof, support a *prima facie* case of obviousness of the

invention recited in Claim 1. This is so for at least two reasons. First, even when combined, these references do not teach or suggest all the claimed features. Second, there is no motivation to combine the cited references.

The outstanding Office Action acknowledges that the combination of Fukuno and North fails to teach or disclose a recess that is circularly symmetrical. Soechting is cited for disclosing flow paths 92 which are purportedly circularly symmetrical, the motivation for the modification of Fukuno and North by Soechting being based on the provision of an exhaust of used cooling air from the vane without turbulence. Applicants respectfully submit that such a combination would still not remedy the above-noted deficiency of Fukuno and North and is based on an unsubstantiated conclusion which is technically unsupported, as further discussed below.

Similarly to North, the flow paths 92 of Soechting, or the flow paths 118 for that matter, are not disposed circularly, but on a line as clearly illustrated on FIGS. 2 and 6 and also emerging in the exhaust cavity.

As to the motivation to modify Fukuno and North by Soechting, Applicants respectfully submit that it is well known in fluid mechanics that transition from laminar flow to turbulent flow is primarily controlled by the Reynolds number¹ of the flow and surface roughness of the flow passage. All three cited references are silent as to specific dimensional or flow characteristics and properties in the disclosed passages for one to reach the conclusion that the flow passages of Soechting discharge the air without turbulence. Given the similarity of the passages in the three references, and absence of any information about the flow and surface conditions, such a claim is found by Applicants to be simply an

¹ The Reynolds number, or Re, being defined as $Re = \frac{\rho V D}{\mu}$, where ρ is the fluid density, V is the fluid velocity, and μ the viscosity of the fluid.

unsubstantiated conclusory reason to combine references in order to obviate Applicants' invention.

In rejecting a claim under 35 U.S.C. 103(a), the USPTO must support its rejection by "substantial evidence" within the record,² and by "clear and particular" evidence³ of a suggestion, teaching, or motivation to combine the teachings of different references. There is no substantial evidence, nor clear and particular evidence, within the record to support the conclusion that the flow conditions in Soechting are any different than they are in Fukuno or North. As such, Applicants respectfully request that such evidence be provided or the rejection based on the combination of Fukuno, North and Soechting be withdrawn.

Based at least on the foregoing, Applicants respectfully submit that Fukuno, North, and Soechting, neither individually nor in any combination thereof, make obvious the invention recited in Claim 3. For the foregoing remarks, Applicants respectfully request withdrawal of the rejection of Claim 3 under 35 U.S.C. § 103(a).

Finally, Applicants have submitted new Claims 8-20, which find non-limiting support on the subject matter originally disclosed as follows: (1) as to Claims 8-10, 12-14, and 20, on the originally filed claims; (2) as to Claim 11, on FIGS. 2 and 3; (3) as to Claims 15-17, on page 6, line 20-page 7, line 3; and (4) as to Claims 18 and 19, on page 6, lines 9 and 10. Therefore, new Claims 8-20 are not believed to raise a question of new matter.⁴

New independent Claim 8 recites a turbine vane, comprising, among other features, *a groove in an air leakage passage, the groove being disposed in the vane* and being

² In re Gartside, 203 F3d 1305, 53 USPQ2d 1769 (Fed. Cir. 2000) (holding that, consistent with the Administrative Procedure Act at 5 USC 706(e), the CAFC reviews the Board's decisions based on factfindings, such as 35 U.S.C. § 103(a) rejections, using the 'substantial evidence' standard because these decisions are confined to the factual record compiled by the Board.)

³ In re Dembiczak, 175 F3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999) ("We have noted that evidence of a suggestion, teaching, or motivation to combine may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved, although 'the suggestion more often comes from the teachings of the pertinent references.' The range of sources available, however, does not diminish the requirement for actual evidence. That is, the showing must be clear and particular.")) (emphasis added).

⁴ See MPEP 2163.06 stating that "information contained in any one of the specification, claims or drawings of the application as filed may be added to any other part of the application without introducing new matter."

Application No. 10/776,280
Reply to Office Action of February 10, 2005

configured to generate a head loss in the air leakage passage so as to reduce an airflow rate passing through the air leakage passage. New Claims 9-20 depend from Claim 8. Based at least on the above-noted discussion and the allowable subject matter of Claims 4-6, Applicants believe that new Claims 8-20 patently distinguish over Fukuno, North, and Soechting, individually or in any combination.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application, and the present application is believed to be in condition for formal Allowance. A Notice of Allowance for Claims 1-20 is earnestly solicited.

Should the Examiner deem that any further action is necessary to place this application in even better form for allowance, the Examiner is encouraged to contact Applicants' undersigned representatives at the below listed telephone number.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Philippe J.C. Signore, Ph.D.
Attorney of Record
Registration No. 43,922
Mardson Q. McQuay
Registration No. 52,020

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 06/04)

PJS/MQM/kkn
I:\ATTY\MQM\24's\248789USAM 5-10-05.doc